

Remarks

This request for continued examination is made in response to the Final Office Action mailed on October 31, 2003.

Claims 1, 5-8 & 11-25 are pending. Claims 2-4 & 9-10 are canceled. All pending claims presently stand rejected. Review and reconsideration are respectfully requested in light of the amendments to the claims and arguments presented below.

Claim Rejections - 35 U.S.C. § 112

Claims 1, 5-8 & 11-24 were rejected under 35 U.S.C. § 112 ¶ 1. Claim 1 has been amended so as to avoid any suggestion of a negative limitation. Support the amendment lies in the specification at 12:6-9 (examples of substrates used); 4:11-14 (chemical conversation film thickness); 16:30 (without generating sludge). Corresponding amendments have been made to each of the pending independent claims.

The Invention

The claimed invention relates to a method for forming a lubricative film for the cold working of certain metal materials. As a result, the friction that occurs between a tool and a workpiece is reduced, thereby preventing seizure during cold working.

The present invention addresses performance drawbacks that may result from prior art approaches and avoids adverse environmental impacts that often accompany them (*e.g.*, sludge generation and waste liquid treatment). Problems of previous approaches that are addressed by the present invention are disclosed in the Specification between pages 2-4.

As filed, the Specification disclosed that

“METAL SUBSTRATES USED

Substrates of carbon steel (Type S45C), austenitic stainless steel (Type SUS 304), and aluminum (Type A6061), . . . were cut into pieces . . . These were subjected to an electrolysis treatment and lubrication treatment by the procedures set forth below, after which performance tests were conducted.”

Specification, p. 12, lines 10-12.

None of the examples include a substrate of Ti or Ti alloys.

The Examiner will note that “titanium” and “titanium alloys” do not appear in any of the pending claims. Thus, Applicants are claiming less than the entire scope of their disclosure. It is for the inventor to decide what bounds of protection he will seek. *In re: Saunders*, 444 F.2d 599, 607, 170 USPQ 213, 220 (1971). *In re: Johnson*, 558 F.2d 1008, 194 USPQ 187 (1977). *See also in re: Wertheim*, 541 F.2d 257, 263, 191 USPQ 90, 97 (C.C.P.A. 1976). Inventions are constantly made which turn out not to be patentable, and applicants frequently discover during the course of prosecution that only a part of what they may have disclosed is a patentable invention.

In paragraph 4 of the Office Action, claims 1, 5-8 & 11-21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al. in view of Shimakura et al. and Witte.

Claim 1 calls for bringing a metal substrate “. . . consisting essentially of a metal selected from the group consisting of carbon, aluminum, steel, and an austenitic stainless steel . . . into contact with an aqueous electrolyte solution” Titanium and titanium alloys are excluded from claim 1. Sonoda et al. states that “Unfortunately, at the present time there is no satisfactory lubricant that is suited to the various working processes in the case of titanium and titanium alloys.” '480 Patent, 1:25-28.

Claims 5-8 and 11-18 depend from and incorporate the limitations of claim 1.

Applicants also respectfully challenge the *prima facie* assertion of obviousness because of the differences between the cited references and the claimed invention as now claimed. As combined, the references fail to teach the claimed invention, even if properly combinable. Under § 103, the teachings of references can be combined only if there is some suggestion or incentive to do so (citations omitted). There is no such suggestion or incentive that is disclosed in any of the references which the Examiner proposes to combine. Nor is there any rationale expressed by which a person of ordinary skill in the relevant art would have been motivated to combine the references to arrive at the claimed invention.

In paragraph 5 of the Office Action, claims 22-24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al. for the reasons of record. The Examiner observes that “. . . it would have been obvious to have applied the process of Sonoda to metal workpieces other than titanium or titanium alloy workpieces because the beneficial properties of improved lubricity and cold working characteristics would have been expected to be obtained.” Office Action dated 4/9/03, p. 4, ¶ 10.

Sonoda '480 indicates a lack of transference to ferrous substrates of processes that are unique to titanium-based substrates:

In cold working metal, use is generally made of a lubricant to impart lubricity, so as to prevent seizure, i.e., to prevent direct contact of a tool and material being worked. In the case of steel, for example, oil containing an extreme pressure agent is used in comparatively light working and a soap or solid lubricant in addition to a phosphate to oxalate is used in heavy working. . . . Unfortunately at the present time there is no satisfactory lubricant that is suited to the various working processes in the case of titanium and titanium alloys.

'480 patent, 1:14-28.

Thus, Sonoda '480 lies in a non-analogous art. Titanium lie in Group IV of the periodic table. Titanium typically exhibits the properties of a refractory metal that has a different crystal structure from that of metals outside Group IV. As a result, it is typically quite hard and resistant to deformation. In contrast, iron lies in Group VIII; and aluminum lie in Group III of the periodic table.

Noteworthy also is that zirconium and hafnium – other members of Group IV – are not mentioned anywhere in the written description or in the examples.

Thus, the treatment of a titanium-based substrate requires different engineering approaches and solutions from those that are appropriate to the limited set metal of substrate materials that are included in the examples. Simply stated, the teachings of Sonoda et al., which are unique to titanium and titanium-based alloys, are not teachings to which one of ordinary skill in the art would turn for a solution to the problems of performing a lubricative film for the cold working of the limited set of metal materials that are reported in the examples.

Accordingly, the rejection of claims 22-24 for obviousness based on Sonoda et al. is overcome.

In paragraphs 6-10 of the Office Action, the Examiner discusses the rejection of claim 25 under 35 U.S.C. § 103(a) as being unpatentable over Sonoda et al. combined with Bjerrum et al. (WO 98/09006). The arguments made above are incorporated here by reference.

The equations referred to in paragraph 10 are not involved with electrolysis. They refer to metals in general but they do not apply to titanium because no workpiece metal is eluted in the case of titanium. Therefore, the electrolytic process. The one equation that does refer to the electrolytic process does not refer to metals but merely represents hydrogen gas evolution. In the case of iron based metals, iron ions in the solution are a by-product of the surface reaction and these normally oxidize and eventually precipitate, causing “sludge.”

The electrolytic process slows the transfer of these iron ions to solution and effectively eliminates sludge - a different result from titanium.

The titanium-based process disclosed by Sonoda et al. is thus separate and distinct from the electrolytic process as disclosed and claimed. Its function is as a predecessor to the electrolytic process. It is not part of the process itself. Also, the colloidal particles that act as nucleating agents are titanium dioxide (a ceramic) and not titanium metal. They form an incomplete layer on the substrate and are not part of the titanium surface. Thus, the two should not be equated.

Claim 5 has been amended so that it now depends from claim 1. Claim 11 has been amended so that it also depends from claim 1, thus the objections to claims 5 and 10 are overcome.

If a telephone call would expedite prosecution, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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Date: March 1, 2004

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